REMOVAL ACTION REPORT
PCB CONTAMINATED SOIL
USACE South Pacific Division Laboratory
Sausalito, California

DRAFT FINAL

Prepared by:

US Army Corps of Engineers

Sacramento District
Environmental Engineering Section

August 2006

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA 95814-2922

REPLY TO
ATTENTION OF

Military Branch

August 28, 2006

Mr. Charles Ridenour
Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, CA 95826-3200

Dear Mr. Ridenour,

Please find enclosed the draft final *Removal Action Report, PCB Contaminated Soil, USACE South Pacific Division Laboratory, Sausalito, California* for your review and comment. This report presents the results of the soil removal action conducted to address PCB contamination.

This project was successful in removing about 240-tons of soils containing PCBs from the site. The project action level of 0.74 µg/kg was achieved at all but one confirmation sample location. It was not possible to further excavate at this one location due to the presence of groundwater. Roof material and roof sediments were also tested for PCBs and all results were below the action level. The site has been backfilled and repaved. Proposition 65 signs warning of lead-based paint and asbestos were posted to the building as requested by the San Francisco Bay Regional Water Quality Control Board.

Please provide comments on the draft report by October 30, 2006. Regulatory comments will be incorporated into the final version of the report. If you have any questions please contact me at (916) 557-7817.

Paul B. Feldman

Paul B. Feldman
Senior Project Manager

cc:
John Kaiser
San Francisco Bay, Regional
Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, California 94612

EXECUTIVE SUMMARY

The former U.S. Army Corps of Engineers (USACE) South Pacific Division (SPD) Laboratory is a two-acre site located at 25 Liberty Ship Way, Sausalito, California. Beginning in the 19th century the area was used as a rail yard. It was developed into a shipyard during World War II. The USACE acquired one building from the shipyard after the war (1948), and this was converted into the SPD Laboratory. A series of investigations have been conducted at the site beginning in 1998. These investigations have found Polychlorinated Biphenyl (PCB) in the soil and petroleum hydrocarbon contamination in the soil and groundwater. The contamination appears to be distributed in a sporadic fashion and is judged to be associated with historical activities that pre-date the SPD Laboratory operations. This removal action was focused on the PCB contamination.

The current and future land use is commercial/industrial. The goal of the removal action was to remove the largest mass of PCB contaminated soil and to generally reduce the PCB concentrations to levels below 0.74 mg/kg (U.S. Environmental Protection Agency (USEPA), Region 9 Preliminary Remedial Goals (PRGs) and California Region 2 Regional Water Quality Control Board Environmental Screening Levels (ESLs) for industrial land use. Upon initial excavation, post excavation confirmation samples were collected. Sample results exceeded the PRGs for three samples. Additional excavation was necessary and was accomplished at two of these locations. At the third sample location, further excavation was not possible because groundwater was encountered. At project completion, confirmation sampling verified that PCB soil levels were below the PRGs in all other areas where soil had been excavated. Approximately 240-tons of soil were excavated from the site and taken to Altamont Landfill as non-hazardous waste.

Additionally, roof material was sampled for the presence of PCBs. PCB results were less than the PRGs for all samples of roof material. Therefore no further sediment sampling was performed and there was no need to remove sediment from within the storm drains.

Upon completion of excavation and sampling activities (excavation, confirmation sampling, and backfilling), the site was repaved and restored to previous conditions, and a post-project survey was conducted.

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ACRONYMS AND ABBREVIATIONS

AB	Aggregate Base
ASG	Advanced Solutions Group
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
DTSC	Department of Toxic Substance Control
ESL	Environmental Screening Level
ITSI	Innovative Technical Solutions, Inc.
MDL	method detection limit
mg/kg	milligrams per kilogram
PCB	Polychlorinated Biphenyl
PCP	Pentachlorophenol
PCE	Perchloroethylene (Tetrachloroethene)
PQL	practical quantitation limit
PRG	Preliminary Remedial Goal
QAPP	Quality Assurance Project Plan
QC	quality control
RAWP	Removal Action Work Plan
RL	reporting limit
RPD	relative percent difference
SAP	Sampling and Analysis Plan
SPD	South Pacific Division
TPH	Total Petroleum Hydrocarbons
USACE	United States Army Corps of Engineer
USEPA	United States Environmental Protection Agency

REMOVAL ACTION REPORT
EXCAVATION of PCB CONTAMINATED SOIL
USACE South Pacific Division Laboratory
Sausalito, California

1.0 INTRODUCTION

1.1 Project Overview

This report summarizes the site activities conducted at the U.S. Army Corps of Engineers (USACE) South Pacific Division (SPD) Laboratory, located in Sausalito, California (Figure 1). The purpose of the removal action, as described in the *PCB Removal Action Work Plan South Pacific Division Laboratory, Sausalito, California* (USACE, 2005), was to excavate previously-identified PCB contaminated soil and to reduce the contamination to levels below U.S. Environmental Protection Agency (USEPA), Region 9 Preliminary Remedial Goals (PRGs) and California Region 2 Regional Water Quality Control Board Environmental Screening Levels for industrial land use. A PCB soil action level of 0.74 milligrams per kilogram (mg/kg) was used for this project. Additionally the project included characterization of possible PCB contamination on roofing material and in storm drains at the site, and removal of PCB contaminated material from these areas (if indicated by sampling results). The removal of the contaminated soil with the highest PCB concentrations, combined with repaving, reduces the current and future risk of exposure to the contamination for both workers and visitors to the area, effectively stopping exposure to all but future intrusive workers.

All site activities were performed by Innovative Technical Solutions, Inc. (ITSI), in accordance with the Removal Action Work Plan (RAWP). Field work was conducted from April 20 through May 26, 2006. The scope of this report includes the field activities and procedures, analytical results of samples, evaluation of analytical results, and conclusions.

1.2 Regulatory Authority

The lead regulatory agency is the California Department of Toxic Substances Control (DTSC). The San Francisco Regional Water Quality Control Board is supporting DTSC on this project. Charles Ridenour is the point of contact at DTSC and John Kaiser is the point of contact for the Water Board.

1.3 Site Background

1.3.1 Site Description

The USACE SPD Laboratory site is located at 25 Liberty Ship Way, Sausalito, California. The site is approximately 2 acres in size and lies along the Richardson Bay waterfront in Sausalito (see Figures 1 and 2). The primary building on the site is a two-story structure that served as the laboratory. In addition, a small chemical storage building and a fenced equipment storage yard are present. The parcel is almost entirely paved and lies in the midst of an industrial/commercial area.

1.3.2 Site History

The area surrounding the site was first developed in the 1870's when the former Northwestern Pacific Railroad rail yard was constructed. Prior to this, the area was a tidally influenced marsh. The rail yard was replaced in 1942 with the Marinship Corporation Shipyard. Many of the buildings currently in the area, including a machine shop destined to become the SPD Laboratory, were constructed at this time. In 1946 the Marinship shipyard was placed with the War Assets Administration, which in turn transferred the subject parcel to the USACE in 1948. The former machine shop was converted to a geotechnical testing laboratory in 1950 and the analytical laboratory capability was added in the early 1990's. The SPD Laboratory closed in 1997.

1.3.3 Site Geology and Physiology

The City of Sausalito lies along the eastern side of the Marin County peninsula to the north of San Francisco. This area also lies within the northern Coast Range Province, which extends for about 600 miles in a generally northwest to southeast direction from Los Angeles into Oregon. In general, the province consists of a series of independent valleys and mountain ranges which rarely exceed 6000 feet in elevation. The generally low-lying hills of the Mendocino Range which form the Marin Peninsula are dominated by prominent Mount Tamalpais (elevation 2,604 feet). Sausalito lies on a shelf situated between the base of the hills and San Francisco Bay.

1.3.3.1 Geology

Because of the complexity of the geology, the Bay Area is divided into three blocks. Sausalito falls within the San Francisco Block which includes the region east of the San Andreas Fault westward to the Hayward Fault and the Berkeley Hills near Oakland.

The rock types common to the area include serpentine and a heterogeneous assemblage of Upper Jurassic to Cretaceous age (140- to 65-million years old) marine sedimentary, volcanic, and metamorphic rocks known as the Franciscan Formation. Rock exposures in the area of Sausalito are primarily greywacke (a dark gray sandstone) with some shale, chert, limestone, and an altered volcanic rock referred to as greenstone. These rocks are well exposed in the Marin headlands. Within the project area, underlying Franciscan rocks are overlain by colluvium from the adjacent slopes and by a combination of bay mud and man-made fill.

1.3.3.2 Groundwater

There are no known aquifers underlying the site capable of producing a sustainable water supply. Groundwater is encountered at a depth of about 6 to 12 feet below the ground surface. There are no municipal wells located within three miles of the Laboratory and there are no drinking water wells located within the City of Sausalito (USACE, 2005, Appendix F).

1.3.3.3 Faulting and Seismicity

There are no known active faults within the City of Sausalito. The northwest-southeast trending San Andreas fault zone lies approximately 6.5 miles southwest of Sausalito. Other active faults in the region include the San Gregorio-Seal Cove (9 miles), the Rodgers Creek fault (2 miles) and the Hayward fault (13 miles). The San Andreas fault is capable of generating a maximum credible earthquake of magnitude 8.5. The San Gregorio-Seal Cove, Rodgers Creek, and Hayward faults are each capable of generating a maximum credible earthquake of magnitude 7.5.

1.3.3.4 Geotechnical Hazard Zones

According to the General Plan for the City of Sausalito, the city has been divided into five geotechnical hazard zones based on the existing and potential geologic and seismic hazards present in each area. The SPD Laboratory lies in Zone mu which

> "corresponds to the low-lying margin of Richardson Bay that is underlain by a combination of man-made fill and Bay Mud. The slope stability hazards are low due to the lack of relief. The potential for secondary seismically-induced ground failures, including liquefaction, lurch cracking, lateral spreading and settlement, is moderate to high. This is due to the relatively unconsolidated nature of the sediments, some of which may be granular, and the very low elevation of this area. Portions of this area may undergo long term settlement as a result of consolidation of the Bay Mud or fill. The potential for inundation of this area from stream flooding, high tides, storm waves, or tsunamis is high. The potential for the presence of expansive soils is moderate to high." (City of Sausalito, 2006).

1.4 Previous Investigations

Below is a brief discussion of previous site investigations, as they directly pertain to this removal action of PCB contaminated soil. See the RAWP for a more complete summary of previous investigations.

1.4.1 Preliminary Environmental Assessment

The Army conducted a Preliminary Environmental Assessment in 1998. This assessment involved records research and a site visit. The assessment identified the past industrial use (railroad yard and shipyard). No environmental samples were collected during the assessment (ITSI, 1998).

1.4.2 Preliminary Site Investigation

The Army conducted a Preliminary Site Investigation in 1999. The goal was to determine if contamination was present on site. The report stated that PCBs, phenanthrene, lead, and arsenic appeared to have been released to the soil, while tetrachloroethene (PCE) was identified in the groundwater (ITSI, 1999).

1.4.3 Remedial Investigation

The Army conducted a Remedial Investigation in 2001/2002. The goal was to further investigate arsenic in soils, to delineate the extent of PCE in groundwater, and to establish the lateral and vertical extent of PCBs in soil. A radiological survey was also performed. This investigation confirmed the presence of petroleum hydrocarbons, polycyclic aromatic hydrocarbons and arsenic in the soil. Lead was not determined to be a site contaminant. Arsenic concentrations were judged to fall within the range of values expected for dredge fill (the site received dredge fill when the shipyard was constructed in the 1940's). Petroleum hydrocarbons (diesel range or higher), toluene, xylenes, and pentachlorophenol (PCP) were found in the groundwater. The metals detected in the groundwater are not thought to represent contamination. With the exception of the area near the holding tank (Excavation 3; see Figure 3), the PCBs in soil were sporadically distributed and did not appear to represent a large mass. Petroleum hydrocarbon contamination was widely distributed across the site (at concentrations up to 470 mg/kg), but was not judged to represent a health threat or a significant risk to groundwater quality (ITSI, 2003).

1.4.4 Phase I Environmental Site Assessment

In 2004 the U.S. Veterans Administration conducted a Phase I Environmental Site Assessment in preparation for property transfer. The goals of the assessment were to identify the potential for unknown site contamination to exist at the site. The assessment included a records review and examination of existing reports. The conclusions of the assessment were similar to those in the Army's 1998 Preliminary Environmental Assessment. In addition to the railroad yard and shipyard, the nearby Schoonmaker Building and drycleaners were identified as potential sources of contamination that could affect the site. No environmental samples were collected during this work (ASG, 2004a).

1.4.5 Subsurface Investigation of Soil and Groundwater Quality

As a follow-up to the Phase I Environmental Site Assessment, the U.S. Veterans Administration conducted a Subsurface Investigation of Soil and Groundwater Quality in 2004. The goal of the investigation was to confirm the results of previous activities and to investigate areas not previously characterized. The contaminants detected were consistent with those identified during earlier work; PCBs and petroleum hydrocarbons were found in the soil, and benzene, toluene, and naphthalene (fuel constituents) were found in the groundwater (ASG, 2004b).

1.4.6 Conceptual Site Model

The conceptual site model is based on the site history and the chemical data gathered beginning in 1998 (USACE, 2005). The site was originally a tidally influenced marsh. Later the site was developed as a railroad yard, with the ground surface remaining close to the original elevation. The northeast part of the railroad yard near the bay was probably tidally influenced. The railroad yard operations lasted from the 1870's to 1942. In 1942 the ground surface of the site was raised with fill (and dredged sediment) as a part of the larger construction of the shipyard. A machine shop was built that would later become the SPD Laboratory building. It was during the railroad and shipyard periods of operation that petroleum hydrocarbon products and PCBs were released to the site. They were apparently released in relatively small amounts and in a sporadic fashion. It is this historical contamination that site investigations have identified. Figure 3 shows the location of PCB concentrations in the vicinity of the proposed excavations.

Since there are no drinking water wells located within the City of Sausalito, receptors will not be exposed to site contaminants via the drinking water pathway. The contaminants at the site are not highly mobile in the subsurface. This lack of contaminant mobility, the fine-grained soil conditions, and the expected slow rate of groundwater movement also will minimize the likelihood of contaminant transport into Richardson Bay and consequently receptor exposure.

The site is largely paved which will minimize exposure to contaminants in the soil. However, construction or utility maintenance activities involving soil excavation might expose workers to contaminated soil. This is judged to be the only complete exposure pathway.

1.5 Future Land Use

The USACE plans to transfer the property to the U.S. Veterans Administration who will renovate the building for consolidated medical testing operations. A portion of the laboratory building may be set aside for City of Sausalito community activities. The site lies within a commercial/industrial zone in the City of Sausalito. It is not anticipated that this land use will change. The Department of Toxic Substances Control requires land use restrictions for sites that do not achieve residential clean-up standards, as anticipated for the SPD Laboratory. If, as discussed above, the U.S. Army Corps of Engineers transfers this property to the U.S. Veterans Administration, the RAWP, this removal action report, and the environmental condition of property report will document the land use restrictions. Should the federal-to-federal transfer not occur, and title transfer take place, then appropriate deed restrictions will be prepared in addition to the land use restrictions discussed above.

1.6 Remedial Alternative Decision

The RAWP explored the following alternatives:

1. No Action
2. Institutional Controls (restricted access and land use controls)
3. Capping
4. Excavation and Paving

Nine evaluation criteria were considered: overall protection of human health and the environment, compliance with ARARs, long-term effectivenss and permanence, reduction of toxicity, mobility and volume, short-term effectiveness, implementability, cost, state acceptance, and community acceptance. Excavation and paving was the selected alternative (USACE, 2005).

1.7 Project Staffing

ITSI performed the fieldwork, and the USACE, Sacramento District wrote this report.

ITSI Team Members

Program Manager	Arvind Acharya

Project Geologist	Eric Ehlers
USACE Team Members	
Project Manager	Paul Feldman
Senior Environmental Engineer	Brad Call
Project Chemist / Risk Assessor	Cory Koger
Project Geologist	BJ Bailey
Industrial Hygienist	David Elskamp
Environmental Engineer	Kathy Greene
Environmental Engineer	James Stellmach
Draftsman	Glenn Cox
Technician	Suzette Ramirez

2.0 FIELD ACTIVITIES AND SOIL SAMPLING RESULTS

This section presents the soil excavation and sampling activities, as well as all related activities. Field activities were performed in accordance with the RAWP. Any deviations from the RAWP were minor and are noted in the text below.

2.1 Permitting and Notification

The USACE provided public notification of the project, with a 30-day public comment period. No excavation permits or other permits were necessary for this project. Four painted metal signs were posted at the site warning of asbestos and lead-based paint in the area.

2.2 Pre-Excavation Survey and Site Preparation

Prior to excavation, the horizontal and vertical coordinates of the excavation site were surveyed by a California licensed surveyor (survey data is included in Appendix E), and an existing metal fence delineating the SPD Lab from the Bay Model Building was removed. Before asphalt removal and excavation activities, Underground Service Alert marked underground utilities. The underground holding tank (Excavation Area 3, see Figure 3) was also located and marked prior to all work. After the survey was complete it was noticed that the borings advanced during the Veteran's Administration investigations were not located as shown on the reports prepared by Advanced Solutions Group. A revised map of the site was prepared that indicated the PCB contamination was not as extensive in the Excavation 3 area as previously thought. Therefore the boundaries of Excavation 3 were adjusted to the configuration shown on Figure 3.

2.3 Excavation

Soil was excavated per proposed excavation boundaries (Figure 3 and Figure 4) and placed into watertight roll-off units until disposed. The two 20-foot by 20-foot excavations (Excavations 1 and 2) were dug to approximately 4 feet below ground surface (bgs). Excavation 3 was dug to a depth of 5 feet bgs. Effort was made to protect underground utilities during the excavations. Underground utilities and the underground holding tank located in Excavation 3 were supported in place to allow for the removal of the underlying soil. To avoid damage to these utilities, excavation in these areas was performed by hand. All excavations were backfilled with clean fill to 95 % relative compaction (backfill certification letter is included as Appendix G).

2.3.1 Excavation 1

Excavation 1 is the farther west of the 20-foot by 20-foot excavations (Figure 3). Site activities began April 24, 2006, with site layout and saw-cutting of the asphalt surface. On April 25 removal of the asphalt was attempted, but the asphalt was 8- to 12-inches thick, much thicker than anticipated (approximately 4-inches thick), leading to initial difficulty completely cutting through and scraping up the asphalt. Deeper saw cuts were made, and starting April 26 the asphalt was broken up with a backhoe with a breaker attachment. Asphalt and soil were excavated and loaded into a backhoe bucket, from which the material was loaded into a 20-yard roll-off bin. Two steel pipelines were uncovered running parallel with the Bay Model building (a two-inch pipe located directly above a one-inch pipe). The pipes were about 5 feet from the building and 3.5 feet below the surface. Both pipes had holes in them. As these lines were unearthed, water was evident in the excavation. It was not immediately apparent where the water came from, but after about an hour of observation ITSI personnel concluded that it was groundwater (as the water level did not rise or drop during the remainder of the day). The remainder of Excavation 1 was completed above the groundwater level.

Excavation continued on April 27. Sixty-five tons of class II aggregate base rock (AB) was delivered to the site. Approximately half the AB was used to backfill the excavated section along the Bay Model building so that excavation of the remaining soil could be completed (the remaining soil had been left unexcavated as structural support for the Bay Model building). The base rock fill was too wet to achieve sufficient compaction, so the grade along the building was built up to offer additional structural support, and the unused rock was spread out to dry nearby on site. Excavation 1 was then completed on April 27, approximately 4 feet bgs and 19-feet by 20-feet in area (Figure 4). Soil sampling was completed April 27 (see Section 2.4.1).

Backfilling continued April 28. A backhoe was used to turn over the base rock stockpiled near the excavations so that it would dry out evenly. Backfilling was accomplished in 6-inch loose lifts, and compacted with a Wacker-type mechanical compactor and a smooth drum roller. Backfilling was completed May 2 (to approximately 3 inches bgs, to allow for repaving the site).

2.3.2 Excavation 2

Excavation 2 is the farther east (and south) of the 20-foot by 20-foot excavations (Figure 3). Following completion of excavation at Excavation 1, asphalt and soil removal at Excavation 2 began on April 27. Approximately 85% of the asphalt and 20% of the soil from Excavation 2 was removed on April 27. A 6-inch PVC waterline (in good condition) was encountered in the south side of the excavation (running parallel to the SPD lab building). Excavation continued April 28. Three lines were found in the excavation running parallel with the building: an 8-inch PVC line, 55-inches off the building and 31-inches below asphalt; an 8-inch steel line, 41-inches off the building and 41-inches deep; and what appeared to be a 10-inch steel line, 48-inches off the building and 48-inches deep. To limit the possibility of damage to the lines, excavation near underground lines was done with hand tools. Excavation 2 was then nearly completed on May 1, leaving two 5-foot by 5-foot areas in place to support the Bay Model building's foundation. Following soil sampling May 2 (see Section 2.4.2), Excavation 2 was completed May 3 (removal of the structural-supportive areas, following backfill of adjacent previously-excavated areas). All exposed pipelines were bedded with sand prior to backfilling with AB material. Backfilling was accomplished in 6-inch loose lifts, and compacted with a Wacker-type mechanical compactor and a smooth drum roller. Backfilling was completed May 5, to approximately 3 inches bgs.

2.3.3 Excavation 3

Excavation 3 is the farthest east (and north) of the three excavations (Figure 3). As described above, the boundary of this excavation was changed to that shown on Figure 3 to conform to the more accurate survey of the Veterans Administration's borings.

Following completion of soil removal at Excavations 1 and 2, asphalt and soil removal at Excavation 3 began May 2. Excavation continued May 3. On May 4 several transite lines were encountered approximately 2 feet bgs (lines appeared broken and abandoned). Care was taken to not disturb the transite. ITSI coordinated with USACE regarding contacting an asbestos abatement firm to handle the transite. On May 5 excavation continued, avoiding the transite lines, and additional transite lines were encountered approximately 3 feet bgs (lines appeared abandoned), so excavation continued in areas without transite.

Excavation activities continued May 8. Sterling Environmental (ITSI subcontractor) removed all transite material in the excavation. Transite was removed, double bagged, and labelled per applicable regulations, and disposed as non-friable asbestos waste at Altamont Landfill (Appendix F). Approximately 60 feet of transite pipe was removed. After transite removal, excavation proceeded slowly via hand shovelling around the various unknown utility lines encountered in the excavation.

A rusty and deteriorated 10-inch corrugated metal pipe was uncovered the east end of the excavation. The pipe is apparently connected to the SPD gutters and floor drains, and then runs to the storm drain. Upon being contacted by ITSI, USACE directed that the pipe be repaired. Excavation was completed May 9. The corrugated metal pipe was repaired May 10: approximately 5 feet of the drain line was removed, then approximately 15 feet of 8-inch schedule 40 PVC pipe was fed inside the old pipe so that new pipe extended past the excavation on both sides of the pipe. The connections were secured by making a poured-in-place concrete collar around the pipes where the old and new pipes met, and the pipe was bedded with sand and a metallic warning tape was placed on the pipe. Soil sampling occurred May 8 and May 10 (see Section 2.4.3). AB fill was placed in 6-inch loose lifts and compacted to 95 percent relative dry density, and backfilling was completed May 12.

2.4 PCB Sampling Activities

The Sampling and Analysis Plan (SAP) (USACE 2005, Appendix A) developed for this sampling event was adhered to during all sampling activities. As excavation progressed to near the proposed excavation limits, soil samples were taken and field screened using Strategic Diagnostics Inc. immunoassay test kits. When screening results indicated concentrations less than 0.75 mg/kg, excavation was considered complete and laboratory samples were collected. When screening results were greater than 0.75 mg/kg, excavation was continued for a minimal distance, and an additional screening was done. For borderline results, additional excavation and screening was at the discretion of the ITSI Project Geologist. Field screening results are included as Appendix B.

All confirmation soil samples were analyzed for PCBs, using EPA Method 8082. Sample locations' horizontal and vertical coordinates were surveyed by a California licensed surveyor (survey data is included in Appendix E). Additional samples were taken of roofing material and roof drains at the SPD Laboratory building. Samples were analyzed for PCBs, using EPA Method 8082. Laboratory results and chains of custody are included as Appendix C.

2.4.1 Excavation 1

The sampling protocol as detailed in the RAWP was followed: two floor samples and four wall samples (one from each wall midpoint) were collected. No field screening results indicated the need for additional excavation.

Wall sample SPD-LAB-EX1-04 resulted in a non-detectable PCB level. Wall samples -01, -02, and -03 had detectable PCB results, but results were less than the action level of 0.74 mg/kg. The PCB result for floor sample -06 was 0.2 mg/kg. The PCB result for floor sample -05 was 30 mg/kg. Although this result greatly exceeded the action level, deeper excavation was not accomplished due to encountering groundwater in the excavation. See Table 1 for laboratory results (data qualifiers are explained in Section 4). See Figures 4 and 5 for sample locations (note: in the figures, all sample identification nomenclature is abbreviated; e.g., SPD-LAB-EX1-04 is indicated as SMP1-4).

Table 1a – Excavation 1, PCB Sampling Analytical Data Exceeding Action Level (mg/kg)

Sample	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
Floor Sample							
SPD-LAB-EX1-05[a]	0.58U	1.2U	0.58U	0.58U	0.58U	0.58U	**30**

Table 1b – Excavation 1, Confirmation PCB Sampling Analytical Data (mg/kg)

Sample	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
Wall Samples							
SPD-LAB-EX1-01	0.011U	0.022U	0.011U	0.011U	0.011U	0.011U	0.016
SPD-LAB-EX1-02	0.011U	0.022U	0.011U	0.011U	0.011U	0.011U	0.035
SPD-LAB-EX1-03	0.011U	0.021U	0.011U	0.011U	0.011U	0.011U	0.018
SPD-LAB-EX1-04	0.012U	0.025U	0.012U	0.012U	0.012U	0.012U	0.012U
Floor Sample							
SPD-LAB-EX1-06	0.011U	0.023U	0.011U	0.011U	0.011U	0.011U	0.20

2.4.2 Excavation 2

The sampling protocol as detailed in the RAWP was followed: two floor samples and four wall samples (one from each wall midpoint) were collected. Field screening results were borderline for the east wall sample; the ITSI Project Geologist used professional judgment and collected a laboratory sample at this location without further excavation of that wall (sample SPD-LAB-EX2-04). No other field screening results exceeded 0.75 mg/kg.

Floor samples SPD-LAB-EX2-05 and SPD-LAB-EX2-06 had non-detectable PCB results. Wall samples -01, -02, -03, and -04 had detectable PCB results, but results were less than the action level of 0.74 mg/kg. See Table 2 for laboratory results (data qualifiers are explained in Section 4). See Figures 4 and 5 for sample locations.

Table 2 – Excavation 2, Confirmation PCB Sampling Analytical Data (mg/kg)

Sample	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
Wall Samples							
SPD-LAB-EX2-01	0.011U	0.023U	0.011U	0.011U	0.011U	0.011U	0.043
SPD-LAB-EX2-02	0.012U	0.024U	0.012U	0.012U	0.012U	0.012U	0.023
SPD-LAB-EX2-03	0.011U	0.021U	0.011U	0.011U	0.011U	0.011U	0.040
SPD-LAB-EX2-04	0.013U	0.025U	0.013U	0.013U	0.013U	0.013U	0.52
Floor Samples							
SPD-LAB-EX2-05	0.014U	0.028U	0.014U	0.014U	0.014U	0.014U	0.014U
SPD-LAB-EX2-06	0.015U	0.029U	0.015U	0.015U	0.015U	0.015U	0.015U

2.4.3 Excavation 3

The sampling protocol as detailed in the RAWP was followed: three floor samples and six wall samples (from wall midpoints) were collected. Field screening results exceeded 0.75 mg/kg for four wall samples; additional soil was excavated from those walls, and further field screening was done (field screening passed, with no samples exceeding 0.75 mg/kg), prior to collection of the laboratory samples (SPD-LAB-EX3-03b, -04b, -05b, and -06b; with the "b" designator indicating field screening initially failed at that location). The other field screening results did not exceed 0.75 mg/kg.

Samples SPD-LAB-EX3-01, -05b, -06b, -07, -08, and -09 had detectable PCB results, at levels less than the action level. PCB was not detected in sample SPD-LAB-EX3-04b. Samples SPD-LAB-EX3-02 and SPD-LAB-EX3-3b had PCB result in excess of the 0.74 mg/kg action level (2.1 mg/kg and 1.6 mg/kg, respectively), necessitating further excavation and confirmation sampling at those locations. Upon further excavation and sampling, the PCB result for sample SPD-LAB-EX3-02b was less than 0.74 mg/kg, and PCB was not detected for sample SPD-LAB-EX3-3c (with the "b" and the "c" designators indicative of the additional sampling at those locations). See Table 3 for laboratory results (data qualifiers are explained in Section 4). See Figures 4 and 5 for sample locations.

Table 3a – Excavation 3, PCB Sampling Analytical Data Exceeding Action Level (mg/kg)

Sample	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
Wall Samples							
SPD-LAB-EX3-02	0.051U	0.10U	0.051U	0.051U	0.051U	0.051U	**2.1**
SPD-LAB-EX3-03B	0.030U	0.060U	0.030U	0.030U	0.030U	0.030U	**1.6**

Table 3b – Excavation 3, Confirmation PCB Sampling Analytical Data (mg/kg)

Sample	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
Wall Samples							
SPD-LAB-EX3-01	0.011U	0.022U	0.011U	0.011U	0.011U	0.011U	0.078
SPD-LAB-EX3-02B	0.011U	0.021U	0.011U	0.011U	0.011U	0.011U	0.47
SPD-LAB-EX3-03C	0.010U	0.021U	0.010U	0.010U	0.010U	0.010U	0.365UJ
SPD-LAB-EX3-04B	0.011U	0.021U	0.011U	0.011U	0.011U	0.011U	0.011U
SPD-LAB-EX3-05B	0.010U	0.021U	0.010U	0.010U	0.010U	0.010U	0.50J
SPD-LAB-EX3-06B	0.012U	0.023U	0.012U	0.012U	0.012U	0.012U	0.40
Floor Samples							
SPD-LAB-EX3-07	0.013U	0.026U	0.013U	0.013U	0.013U	0.013U	0.0075J
SPD-LAB-EX3-08	0.014U	0.029U	0.014U	0.014U	0.014U	0.014U	0.12
SPD-LAB-EX3-09	0.013U	0.027U	0.013U	0.013U	0.013U	0.013U	0.054

2.4.4 Roofing Material and Roof Drains

One sample of bituminous roof material (SPD-LAB-R-05) and four sediment samples from roof drains (SPD-LAB-R-01 to -04) were collected. Laboratory results indicated non-detectable levels of PCBs for four of the five samples. The PCB result for sample SPD-LAB R-04 was 0.042 mg/kg, below the 0.74 mg/kg action level. See Table 4 for laboratory results (data qualifiers are explained in Section 4).

Table 4 – Roof and Roof Material PCB Sampling Analytical Data (mg/kg)

Sample	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
SPD-LAB-R-01	0.012U	0.024U	0.012U	0.012U	0.012U	0.012U	0.012U
SPD-LAB-R-02	0.0095U	0.019U	0.0095U	0.0095U	0.0095U	0.0095U	0.0095U
SPD-LAB-R-03	0.0097U	0.019U	0.0097U	0.0097U	0.0097U	0.0097U	0.0097U
SPD-LAB-R-04	0.0097U	0.019U	0.0097U	0.0097U	0.0097U	0.0097U	0.042
SPD-LAB-R-05	0.0098U	0.020U	0.0098U	0.0098U	0.0098U	0.0098U	0.0098U

2.5 Waste Characterization

Soil was sampled for waste disposal characterization at the frequency required by the disposal facility, Altamont Landfill. One sample was collected (April 25). The sample was analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX), PCBs, Total Petroleum Hydrocarbons (TPH) (Diesel- and Motor Oil-range), and CAM 17 Metals. McCampbell Analytical, Inc., Pacheco, California performed sample preparation and chemical analyses for waste characterization. Analytical data from the waste profile sample was reviewed prior to removal of the stockpiled soil from the site. The sample chains of custody and laboratory results are included as Appendix D.

2.6 Waste Stream Handling and Contaminated Soil Disposal

Excavated PCB contaminated soil was loaded into watertight roll-off bins, starting on April 25. Bins were initially loaded approximately two-thirds full. Hauling of loaded bins started May 3. Two truck sizes were available. Bins loaded previous to May 3 were too heavy for the larger truck to take two bins a trip, and too heavy for the smaller truck to take any, so ITSI switched the philosophy for filling the bins, loading some bins less than two-thirds full (so that the small truck was able to take one partially-loaded bin per load), and fully loading some bins (to maximize the volume the large truck would be able to take with one bin per load). All loads were hauled to Altamont Land Fill under non-hazardous waste bills of lading (Appendix F). From May 3 to May 10, bin hauling and drop-off continued. One bin was left onsite on May 10 for ITSI to use for general site cleanup- and restoration-derived wastes.

3.0 SITE CLEANUP AND RESTORATION

Final backfilling occurred May 12. All excavations were graded to leave space for 3.5 to 4 inches of asphalt paving. All backfill lifts tested over 95 percent density prior to adding needed fill. On May 15 the bulk of ITSI's materials were demobilized from the site, and general site debris was placed in a roll-off bin for later disposal. On May 16 remaining base rock and sand were hauled from the site. Asphalt paving occurred May 22, and the post excavation survey occurred May 23 (Appendix E). On May 24, the fence that lies between the SPD Lab and the Bay Model Building was replaced, and demobilization of tools and equipment was completed.

The final bin of general site debris was hauled to Redwood Landfill at project completion, May 26.

4.0 ANALYTICAL DATA QUALITY

Data usability and quality control (QC) issues are discussed here in terms of precision, accuracy, representation and completeness. Data are presented in Appendix C. Curtis and Tompkins, Berkeley, California performed sample preparation and chemical analyses for soil samples. Curtis and Tompkins is a State of California certified and USACE validated laboratory.

4.1 Precision

Precision is controlled through the use of field duplicates and matrix spike duplicates.

Field Duplicates

In accordance with the Quality Assurance Project Plan (QAPP) (USACE, 2005, Appendix A), field duplicates are required at a rate of one per 20 samples of the same matrix. Field duplicate acceptance criteria are defined as 50 RPD (relative percent difference). Sufficient field duplicates were collected for this project. Two analytical results for Aroclor 1260 were flagged as estimated ("J") because the RPD exceeded the comparison criteria of 50. The Aroclor 1260 values flagged were from samples SPD-LAB-EX3-05B and SPD-LAB-EX3-10. No other results were flagged for field duplicate RPD exceedence.

Matrix Spike Duplicates

No data were flagged as a result of matrix spike duplicate precision for this project. No data related to this project were qualified due to matrix spike duplicate anomalies.

4.2 Accuracy

Field control of accuracy is monitored by matrix spikes. In accordance with the QAPP, matrix spikes are required at a frequency of one per 20 samples of the same matrix. No data were flagged as a result of matrix spike accuracy for this project. No data related to this project were qualified due to matrix spike anomalies.

4.3 Representation

The QAPP describes management of sampling procedures, use of appropriate sample containers, adherence to holding times, use of proper preservation, and sampling of equipment and trip blanks. Containers and preservation were used in accordance with the QAPP. Holding times and equipment blanks were evaluated for each analytical result and are discussed here.

Holding Time

Holding times were met for 100-percent of the results. Therefore, holding times were adequately controlled for this project.

Field Blanks

Sufficient equipment blanks were collected based on a frequency of one per sample technique per 20 samples. Of the three equipment blanks collected, one indicated aroclor concentrations above the method detection limit (MDL).

Sample results associated with equipment detections are flagged if they are observed at levels up to five times the value contained in the blank. One sample (SPD-LAB-EX3-3C) was considered non-detect since the reported concentration was below five times the result from the equipment blank. This sample was flagged "UJ". No other analytical results were flagged for field blank contamination.

Results were deemed representative, consistent with the sample design.

4.4 Analytical Completeness

A total of 1.5-percent (3 of 203) of analytical results for normal samples were flagged for QC issues. No results were rejected. All other results met QC criteria. Completeness is defined as the percent of usable data, and the completeness goal from the QAPP is 90-percent for each critical target analyte. In all, 201 of 203 analytical results were usable, resulting in 98.5-precent analytical completeness and meeting the goal for this project.

4.5 Summary of Qualified Results

Results were considered qualified in terms of data usability if they were flagged "U", "UJ", "J", or "R" during data validation. Flags are defined in Table A-2 of the QAPP. Results may be qualified "U" simply because no analyte was detected. Results may be qualified "J" simply because the detected value is between the MDL and the reporting limit (RL), practical quantitation limit [PQL]). In other words, the result is a trace value. Flags are also applied due to QC exceedences. This summary does not consider routine flagging of non-detects and trace results. Qualified results are considered minor if flagged "U", "UJ", or "J" and major if flagged "R". Results are presented in Tables 1 to 4.

Minor Data Quality Issues

A total of 3 results were flagged due to minor QC issues, specifically equipment blank contamination resulting in detections of Aroclor 1260 above the MDL and exceedence of the comparison criteria for RPD in field duplicate comparison.

Major Data Quality Issues

No analytical results were flagged for major issues.

4.6 Data Quality Conclusions

Precision, accuracy, representation and completeness were all substantially under control. The data are suitable for decision-making purposes related to this project such as site characterization, human and ecological risk assessment, and the determination of corrective action measures.

5.0 CONCLUSIONS

The goal of this removal action was to remove PCB contaminated soil and to generally reduce the contamination to levels below USEPA Region 9 PRGs and California Region 2 Regional Water Quality Control Board Environmental Screening Levels for industrial land use. A further goal was to test roofing material and associated roof drains for the presence of PCB contamination. The bulk of the PCB-contaminated soil was removed. Approximately 240 tons of soil were excavated from the site and removed as non-hazardous waste. Post excavation confirmation samples exceeded the PRGs for only one sample (sample SPD-LAB-EX1-05, in Excavation 1). Further soil excavation was not accomplished at that location due to groundwater having been encountered. No roofing material or roof drains sample results exceeded the project's action level. In general, the project goals have been achieved, and the site has been restored to previous conditions.

6.0 REFERENCES

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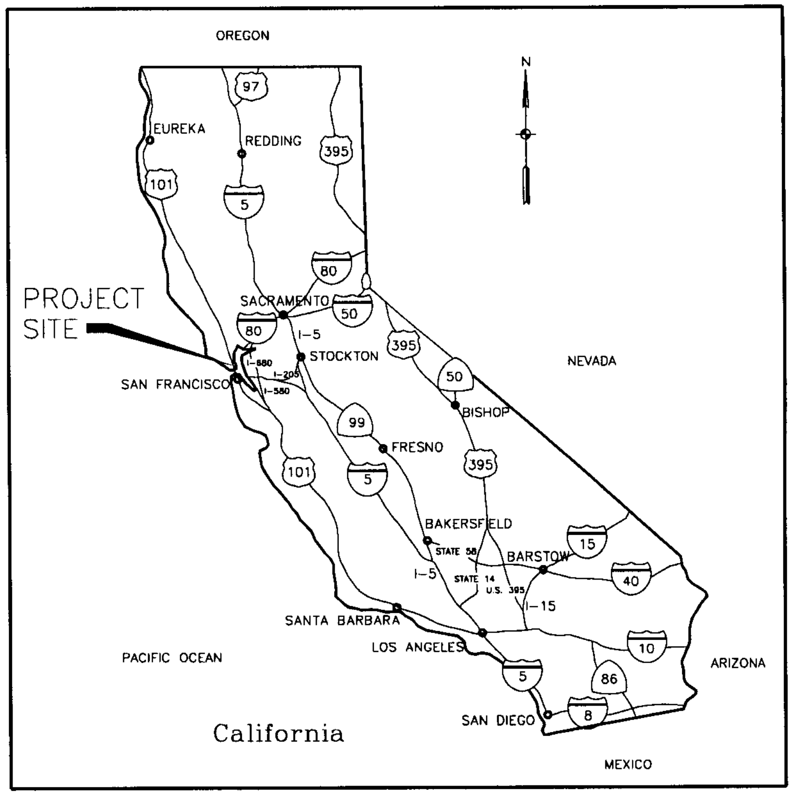
FIGURES



KEY MAP OF CALIFORNIA

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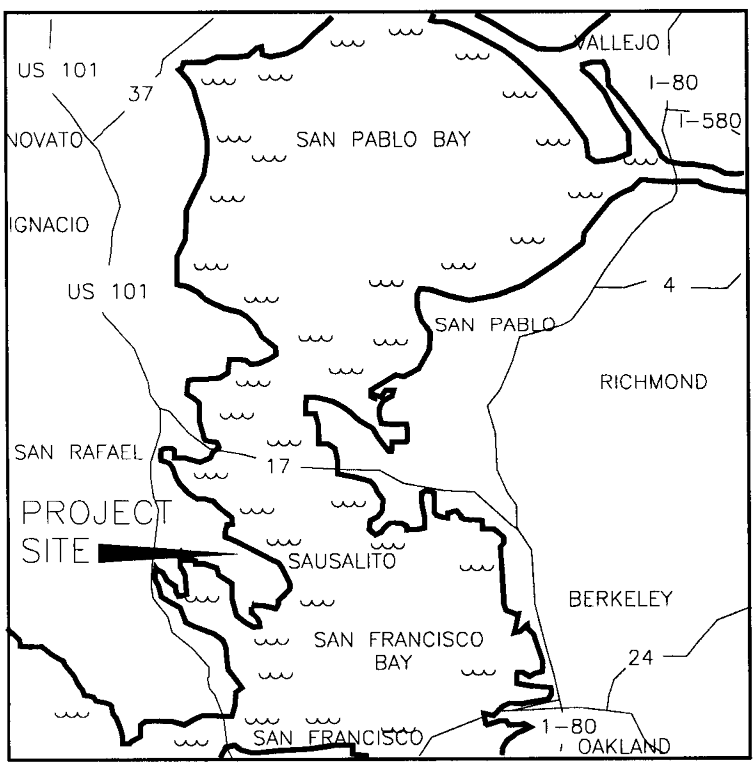

VICINITY MAP

SCALE: NONE

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AUGUST 2006

SAUSALITO CALIFORNIA

SOUTH PACIFIC DIVISION LABORATORY

KEY AND VICINITY MAPS

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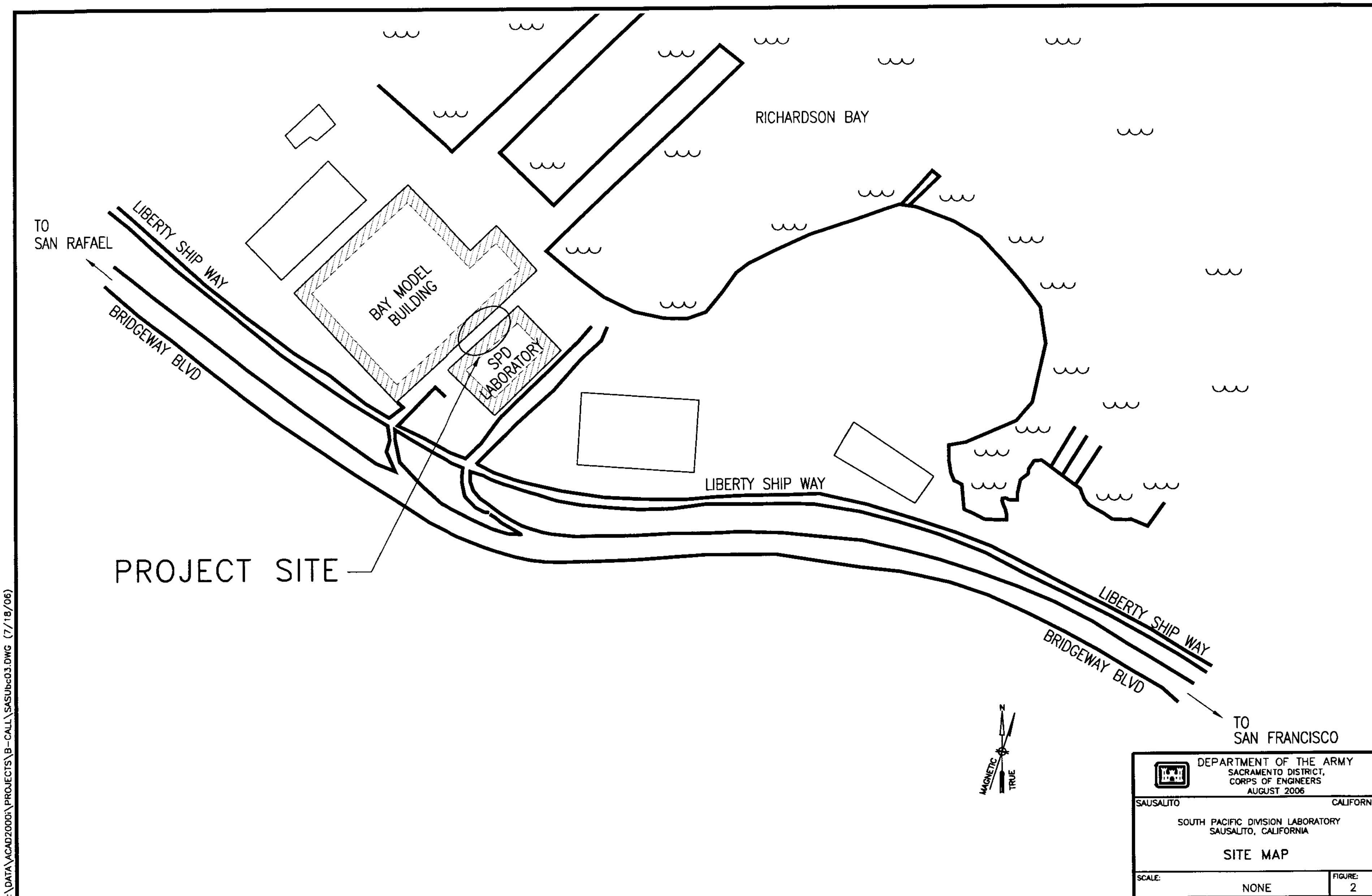

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SAUSALITO CALIFORNIA

SOUTH PACIFIC DIVISION LABORATORY
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SITE MAP

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